

## METHOD FOR PROVIDING INFORMATION FOR PARALLEL PARKING OF A VEHICLE

~~Technical Area~~ Field of the Invention

The present invention relates to a method for providing information for assisting in parallel parking of a vehicle ~~according to the definition of the species in Claim 1.~~

5 Background Information

Growing traffic density and the increased development of open spaces, in metropolitan areas in particular, continuously constrict the room for traffic movement. The available parking spaces are becoming smaller and the search for a suitable parking spot, in addition to the continuously growing traffic volume, puts an extra burden on the driver. When backing into a parking spot in particular, it is frequently considerably difficult to correctly judge the exact size and position of the parking spot.

Known in the automobile art are driver assist systems for vehicles which ~~support~~ assist the driver in various driving situations, e.g., when maneuvering or pulling into and out of parking spots. Among other things, systems for measuring parking spots are known which, when driving past the parking spot, ~~already~~ inform the driver in a suitable manner about the size of the parking spot so that, based on this information, the driver is able to make a sufficiently safe decision/prognosis on whether parking in this parking spot is reasonable. It is known to measure the size of the parking spot using sensors on the side of the vehicle, ~~preferably~~ e.g., ultrasound sensors, and to communicate this measured value to the driver in a suitable manner.

It is disadvantageous in the known parking spot measuring systems that the driver of the vehicle must initially relate the measured

value of the parking spot measurement to the vehicle length in order to decide, based on the relationship of vehicle length and parking spot length, whether the measured parking spot has a suitable length for parking. This procedure requires some concentration  
5 resulting in the driver's attention toward the traffic situation being adversely reduced.

~~Description of the Invention, Object, Approach, Advantages~~

Therefore, it is ~~the~~an object of the present invention to ~~make available~~provide a method for providing the driver of a vehicle  
10 with information for parallel parking the vehicle in a parking spot delimited by (at least) two end points, e.g., obstacles, via which the driver is informed particularly quickly and in a particularly suitable manner about the length (size) of the parking spot in relation to the length (size) of the vehicle. The driver is to be  
15 distracted from the traffic situation as minimally as possible.

~~This object is achieved by a method having the features recited in the characterizing part of Claim 1 in cooperation with the features in the preamble. Preferred embodiments are included in the subclaims.~~

20 Summary

Due to the fact that after the detection of a first obstacle, (or end point) delimiting the length of the parking spot, the vehicle and its position ~~in relation~~relative to an already detected part of the parking spot ~~is~~are shown on a display assigned to the driver,  
25 the ratio ~~relationship~~ of the vehicle length and parking spot length or the detected part of the parking spot ~~corresponding, or essentially corresponding, to the relationship of the vehicle length~~this shown on the display ~~and the shown parking spot length or the already measured part of the parking spot~~, the vehicle driver  
30 obtains suitable information about the relationship of vehicle length and parking spot length based on the true-to-scale display

already while the vehicle is passing the parking spot, ~~formed~~  
defined by the two obstacles (or end points), and thus during the  
measurement of the parking spot length. The important advantage  
of the method according to the present invention is that it is not  
5 the absolute length of the parking spot that is communicated to  
the driver (e.g., visually, acoustically, haptically), but rather  
that the relationship of vehicle length and parking spot length  
is graphically displayed. The absolute length of the parking spot  
is not essential for deciding whether or not the parking spot to  
10 be measured is large enough, instead only the relationship of  
vehicle length and parking spot length is essential. It is  
necessary for the length of the parking spot to exceed the vehicle  
length in order to allow parking in the parking spot. Based on the  
true-to-scale visual display of the vehicle and the parking spot  
15 according to the present invention, the driver receives  
information in a particularly suitable manner while passing the  
parking spot about the prospects of a successful parking operation,  
the distraction from the traffic situation being minimal.

~~A preferred~~An example embodiment of the method according to the  
20 present invention provides for the length of the already measured  
part of the parking spot to be displayed in relation to the minimum  
length needed for parking, subsequent to the detection of the first  
obstacle, which delimits the parking spot length, and prior to the  
detection of the second obstacle. A further ~~preferred~~ example  
25 embodiment of the present invention provides for the already  
detected part of the parking spot to be displayed in a predefined  
color as a function of its length during the parking spot  
measurement. ~~A particularly preferred design variant~~One example  
approach provides for the part of the parking spot, already  
30 detected during the parking spot measurement, to be displayed in  
red, provided that its length is less than the minimum length for  
parking the vehicle. This makes it possible for the vehicle driver  
~~to be able to~~ recognize while passing the parking spot, based on

the color red, that the part of the parking spot measured so far is not sufficiently large for parking. If the part of the parking spot, already measured while the vehicle passes the parking spot, has a length which is greater than or equal to the minimum length for parking the vehicle in the parking spot, and if this already measured part is not or only slightly greater than this minimum length so that driving into the parking spot is not comfortably ensured, ~~a particularly preferred design variant~~ an example embodiment provides for display, in yellow, of the already measured part of the parking spot or of the ~~part~~ segment of the already measured part of the parking spot which exceeds the minimum length of the parking spot. In this case, the color yellow informs the driver that the parking spot is sufficient for parking but is not long enough for comfortable and easy parking (without pulling in and out multiple times). If the parking spot measurement shows that the measured parking spot has a length which makes easy driving into the parking spot possible, the already measured part is displayed in green, ~~in a preferred design variant~~ one example embodiment. In this case, the green display of the parking spot indicates to the driver that the parking spot is long enough for easy parking.

Analogous to the above-mentioned color representation of the parking spot during the parking spot measurement, ~~a preferred design~~ one variant of the present invention provides for display of the parking spot in a predefined color after detection of the second obstacle (end point) delimiting the parking spot, as a function of its length. The parking spot measuring process is completed after detection of the second obstacle and the length of the parking spot is established. The color representation signals to the driver in a rapid and simple manner whether the parking spot is too small (color red), sufficient - but tight - (color yellow), or sufficient for easy parking (color green).

The vehicle and the already measured part of the parking spot, as well as the vehicle's position in relation to the already detected and measured part of the parking spot, are preferably displayed in a perpendicular top view via a display unit assigned to the driver. The actual driving direction of the vehicle preferably corresponds to the displayed driving direction of the vehicle.

Subsequent to the detection of the second obstacle, (end point) delimiting the length of the parking spot, the parking spot measuring system is immediately active again in order to measure additional parking spots. The parking spot measurement ends either after a second obstacle is detected or when the size of the parking spot is determined to be sufficient for easy parking without another obstacle being detected. (The parking spot is thus delimited by only one vehicle). Also in this case, the parking spot measuring system is immediately active again in order to measure additional parking spots. The present invention also provides for the driver to optionally also be able to manually re-start the parking spot measuring system.

A further ~~preferred design variant~~ example embodiment provides for the vehicle's position data and the parking spot's position data to be stored during the parking spot measurement so that, if needed, the driver is able to re-display a predefined number of previously measured parking spots on the display unit. This is particularly advantageous in areas of tightly limited parking space supply when several parking spots are available which have the minimum size but are tight. The vehicle driver may then drive past all parking spots, the length of the respective parking spot being measured and stored during passing. Using the stored parking spot measurements, the driver is then able to compare the individual parking spots with respect to their length and select one of the parking spots.

~~Brief Description of the Drawing~~

~~The present invention is described below in greater detail in an exemplary embodiment based on the attached drawing.~~ Brief Description of the Drawings

Fig. 1 shows a schematic representation of display information for parking spot measurement according to the present invention at the beginning of the parking spot measurement.

Figs. 2 and 3 show ~~a schematic representation~~ representations of display information for parking spot measurement according to the present invention during two different points of the parking spot measurement, ~~and~~.

Figs. 4 and 5 show ~~a schematic representation~~ representations of different display information for parking spot measurement according to the present invention after the completed parking spot measurement.

~~Best Approach for Carrying Out the Invention~~ Detailed Description

In order to inform the driver of a vehicle about the parking spot measurement, and thus inform in a particularly suitable manner whether the measured parking spot is large enough for parking, the present invention provides for the vehicle and its position in relation to the parking spot or ~~to~~ the already detected part of the parking spot to be shown on a display unit assigned to the driver. At the beginning of the measuring process of the parking spot measurement, i.e., when a first obstacle (end point) which delimits the length of the parking spot is detected, vehicle 10, the beginning of parking spot 14 which is represented by the first obstacle (end point), and driving direction 20 are shown on the driver's display unit (Fig. 1). Moreover, ~~it is an provided to show end point 16 of a minimum required parking spot including a minimum length is shown~~ on the display unit. Without looking over the shoulder, which would represent a distraction from the traffic situation, the vehicle driver is able to use this display to

ascertain how far past the first obstacle he has gone, as is schematically shown in Figure 1. The placement on the vehicle of the sensors used for the parking spot measurement is of utmost importance for establishing how far past the first obstacle he has gone in order to be able to detect the obstacle. Already measured part 12 of the parking spot is constantly displayed during the vehicle's further passing of the parking spot to be measured (Figures 2 and 3). The vehicle driver is informed in a particularly suitable manner how large the already measured part of the parking spot is compared to a parking spot with a minimum required length which is indicated on the display unit by end point 16 (in conjunction with the beginning of parking spot 14). In order to inform the driver as quickly as possible about whether the size of the parking spot (during or after its measurement) is sufficient for parking the vehicle, the ratio of the vehicle length to the length of the parking spot or to the already measured part of the parking spot corresponds to the ratio of the displayed vehicle length (vehicle 10) to the displayed (measured) parking spot or to displayed, already measured part 12 of the parking spot. The absolute length of the parking spot is known after the second obstacle (end point) defining the parking spot is detected. At this point in time, end 18 of the measured parking spot may be graphically displayed to the driver. If the length of the parking spot is less than the minimum required length (Figure 4), this is indicated by red coloring of the displayed parking spot or displayed part 12 of the parking spot. However, if the parking spot is sufficient (Figure 5) the parking spot is displayed in the color green. If the parking spot is sufficient but tight, the displayed parking spot or displayed part 12 of the parking spot is shown in yellow.

~~Abstract~~

ABSTRACT

~~Described is a~~ method for providing information for the driver  
of a vehicle for parallel parking of the vehicle ~~via which~~ includes  
sending the driver is particularly quickly informed information  
5 about the length (size) of the parking spot in relation to the  
length (size) of the vehicle. ~~The degree of the driver's~~  
~~distraction from the traffic situation should be kept as minimal~~  
~~as possible.~~ After detection of the first obstacle, (or end point)  
delimiting the length of the parking spot, the vehicle and its  
10 position are displayed in relation to the parking spot or ~~to the~~  
already detected part of the parking spot, on a display unit  
assigned to the driver, ~~the~~. The ratio of the vehicle length to  
the length of the parking spot or the detected part of the parking  
spot ~~corresponding~~ corresponds to the ratio of the displayed  
15 vehicle length to the length of the displayed parking spot or the  
displayed part of the parking spot.

~~(Figure 3)~~